Developing a Science Gateway for Physical Activity Lifelong Modelling & Simulation

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There are major health concerns that relate to the lack of physical activity in a general population. In the UK, a major study has been carried out that brought together health assessment audits across a range of health conditions influenced by physical activity (cardiovascular diseases, musculoskeletal conditions, mental health, etc.) This was used to create PALMS (Physical Activity Lifelong Modelling & Simulation). PALMS is a micro-simulation that predicts the lifelong physical activity behaviour of a population taking into account individual characteristics and their effect on physical activity over time. The model produces individual and aggregated quantitative outputs for quality of life and health conditions related costs. Thus, PALMS can be used to assess the impact of physical activity on the aforementioned health conditions across the population.

A complementary study was also performed to capture evidence of the success of stratified physical activity interventions. This information was merged with PALMS micro-simulation to allow policy decision makers to investigate the cost-effectiveness of new physical activity interventions on targeted groups in a population. In terms of relevance for Africa, the transition of African societies into sedentary working patterns has now made the study of physical activity intervention strategies of increasing importance. In 2018, non-communicable diseases, mostly caused by physical inactivity, were responsible for 41 million (71%) of the world's 58 million deaths, with 15 million dying prematurely (between the ages of 30 and 69 years). Low- and middle-income countries, including African countries, bear over 85% of the burden of these premature deaths, resulting in cumulative economic losses of US$7 trillion over the next 15 years and millions of people trapped in poverty. In addition to the economic and health benefits, increased levels of physical activity offer social benefits and is recognised as a strategic pathway to achieving UN's 2030 Sustainable Development Goals. There is therefore significant interest in using the PALMS model as a basis for evidence-based policy making in African countries. The challenge we address in this work is how PALMS can be deployed as a scientific tool to support research in Africa.

To this end, we adopt the use of digital infrastructures, practice that is established in numerous scientific communities. Many scientists worldwide use research data infrastructures (e-Infrastructures) to support their work and reinforce knowledge transfer within the community. The H2020 Sci-GaIA project (Energising Scientific Endeavour through Science Gateways and e-Infrastructures in Africa –www.sci-gaia.eu) created the Sci-GaIA Open Science Platform. The Platform consists of a range of technologies that facilitates the development of a range of scientific application services from Open Access Data Repositories to Scientific Gateways. Aspects of the Platform have been adopted in the WACREN NREN Services Roadmap. This paper will discuss how the Open Science Platform is being used to create a Science Gateway for PALMS to enable Ghanaian academics and policy makers to use the micro-simulation in their research. This will form potentially the basis of guideline building not only in physical activity but other lifestyle behaviours (e.g. nutrition) as well as facilitating capacity building in developing areas in Africa. By creating this demonstration of how PALMS and the Sci-GaIA Open Science Platform can be used to support research and policy making in Ghana, we will show how our research can be applied in an African context and subsequently can impact policies in other African countries such as Nigeria, Kenya, and Ethiopia.

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